

SkyScoop

The Newsletter of the National Weather Service in Wilmington, Ohio



ISSUE 16

FALL 2008

The Great Wind Storm of 2008

Mike Ryan and Dan Hawblitzel

The Ohio Valley experienced a severe and damaging windstorm on Sunday, September 14, 2008. This storm affected the entire NWS Wilmington forecast area with extensive and widespread wind damage, as well as power outages to over one million homes and businesses. The windstorm developed as the remnants of Hurricane Ike merged with a cold front to the west of the region. However, there were additional factors that contributed to this historic and unprecedented windstorm.



A 20-ton tree lands on a residence in Cincinnati, Ohio, while a corn field is decimated south of Wapakoneta, Ohio. Photos courtesy of Steve Horstmeyer and Bob Warren.

The remnants of Ike merged with a frontal boundary across the lower Ohio Valley Sunday morning. Due to the very low pressure of this system and the presence of high pressure over the southeast United States, the pressure gradient to the south and east of the surface low remained very tight as it raced into northwest Ohio through Sunday evening. There was also an impressive temperature gradient across the cold front, with afternoon temperatures near 90 degrees over the middle Ohio Valley region, while temperatures remained in the 60s behind the front.

Forecasters were initially concerned about the potential for severe thunderstorms and isolated tornadoes for Sunday afternoon, with enhanced wind shear aloft and a moist, unstable atmosphere across the region as the low pressure passed to the northwest.

However, abundant sunshine on Sunday morning prompted deep mixing of the lower levels of the atmosphere, and warm, dry air aloft translated down to the surface. This resulted in the development of a strong temperature inversion between 7,000 and 9,000 feet above the ground, significantly inhibiting instability and consequently limiting the potential for convection as well. Cloud development was also diminished, with skies remaining largely sunny into the afternoon. As a 60-75 mph low-level jet rotated through the region during the afternoon with the low pressure system, these winds were translated to the surface almost completely due to the deep, well-mixed boundary layer beneath the inversion. The strong solar heating only enhanced the mixing. This led to widespread damaging winds across much of the Ohio Valley, with gusts in excess of 70 mph reported. These severe winds persisted for several hours, which resulted in much more extensive damage than typical severe thunderstorm winds,

(Continued on page 5)

INSIDE THIS ISSUE:

A Letter from the WCM	2
June 3-4, 2008 Severe Weather Event	3
Radar Upgrades for the NWS Wilmington	4
NWS Entry-Level Employment	5
How the NWS issues a Warning	6
The Snowstorm of March 7-8, 2008	7
Xenia 1974 Tornado Damage Photographs	9

NWS Wilmington online: <http://www.weather.gov/iln> -- Email: iln.webmaster@noaa.gov

A Letter from the Warning Coordination Meteorologist

Hello Spotters and Emergency Managers,

As we approach the end of 2008, I would like to thank all our severe weather and snow spotters that have supported the Wilmington National Weather Service Office during the past year. I would also like to welcome our new spotters. We have seen some unusual weather events in our county warning area this year. Included in this newsletter are articles on the June 3rd - 4th severe weather event and the high wind event on September 14th which was caused as the remnants of Hurricane Ike passed through the region. We also have included an article on the snowstorm of March 7th - 8th. Your timely reports have been an important part of the warning process. These ground truth reports have either confirmed warnings we have already issued or provided the last key piece of information needed to issue a warning. The winter weather reports that you have provided have been an important part of our operations. These reports have made it easier to issue timely and critical updates, to relay this information to others through the media, and to do post storm analysis so that our forecasters can improve their winter weather forecasts and warnings.

We conducted some severe weather spotter training in the fall of 2007 and continued to conduct classes through the spring of 2008. During this time period we trained about 1850 severe weather spotters. We will begin training again in early 2009. We encourage each trained spotter to attend a session at least once every 2 to 3 years for review and to get any updated information. If you don't attend within that time period, you will be dropped from our database. We need to keep our information as up to date as possible.

We now have more ways than ever to make spotter reports, and I hope that you have taken advantage of some of these methods. I encourage you to use amateur radio, the internet and eSpotter (if available), and/or the unlisted phone number to make your severe weather or winter weather reports. So if you observe the criteria reviewed in our classes, please let us know as soon as possible. Radar combined with other technology can provide a wealth of information on which to base warning decisions. However, the ground truth information that you, the trained severe weather spotter, can provide is vital to the warning process.

We have also included some articles in this issue of the newsletter which we hope you will find interesting. These include articles on flooding and drought issues, improvements in radar information (Terminal Doppler Weather Radar and Super Resolution Data), a tutorial on the software we use to issue warnings, and information on entry level employment. In addition, we have included in this issue some photos of Xenia right after the 1974 tornado. These photos were recently sent to us by some public safety officials in Michigan after they were found in their files.

We hope you enjoy this issue of the SkyScoop. Please don't hesitate to let us know if you have suggestions for articles in future newsletters. Again, the staff of the Wilmington office of the National Weather Service would like to thank each of you for participating in the Skywarn Severe Weather Spotter program. You are a very important part of the warning process.

Sincerely,



Mary Jo Parker
Warning Coordination Meteorologist
National Weather Service
Wilmington, Ohio

Got an Exciting Weather Photo? We Want to Hear from You!

The National Weather Service in Wilmington wants to make it possible for weather spotters across the region to showcase their photos to the world! Pictures may be used in future editions of this newsletter, and in the photo gallery on our website. To participate, send your photos or any other questions to spotreport.iln@noaa.gov. Remember to express your permission for your credited work to be displayed on our website, used in this publication, or featured in a spotter training presentation.

Please be careful! Lightning, flooding, tornadoes, and ice storms make for great photography -- but great danger as well. The staff of the National Weather Service urges everyone to respect the weather and take photographs only when it is safe to do so.

June 3-4, 2008 Severe Weather Outbreak

Andy Hatzos

A nearly stationary frontal boundary stretched across the Ohio Valley during the first week of June, 2008. With plenty of heat and humidity, there was abundant instability for thunderstorms to repeatedly develop across the region. Roughly speaking, five separate rounds of severe weather affected the area between the afternoon of Tuesday, June 3, and the evening of Wednesday, June 4.

The first event struck during the afternoon hours of Tuesday, June 3. A bow echo entered the Cincinnati metro area from the west, spreading quickly southeast along the Ohio River. The line was responsible for some marginally severe hail and significant wind damage in a few locations. One such location was in Robertson County, Kentucky, where a microburst damaged some homes and demolished a few barns.

It only took until early evening for the second event to begin, consisting mainly of large supercell thunderstorms which developed along the front. The line of supercells, aligned roughly from Richmond, Indiana, to Chillicothe, Ohio, was responsible for large hail and two brief tornado touchdowns. Meteorologically speaking, it was the most impressive of the five events, with intense, rotating thunderstorms that looked as well-structured as their great plains counterparts. At around 9 PM, one cell passed just north of the NWS office in Wilmington, and a ragged wall cloud was visible. Over a dozen other reports of funnel clouds were received from around the area. However, what could have been a significant outbreak was held in check by a thin layer of cool air in the lowest levels of the atmosphere. This stable layer, left in the wake of the earlier severe event, helped keep most funnel clouds and strong winds from ever reaching the ground.

Storms remained across the northern Ohio valley overnight, with the next significant event occurring after 7 AM on the morning of Wednesday, June 4. It was similar in many ways to the first event on June 3, with a squall line moving quickly through the tri-state region. One brief tornado touched down near Newtown, Ohio, with more straight-line wind damage reported in the eastern Cincinnati metro area.



The remnants of a destroyed barn near Mount Olivet, Kentucky. Photo Courtesy of Robby Burden.



Flooding near SR 763 near Decatur, SE Brown County. Photo Courtesy of Jerry Dierks.



Downed and damaged trees and power poles line a street in southern Dearborn County, Indiana. Photo Courtesy of Ken Haydu, NWS ILN.

Just after noon, another area of thunderstorms developed along the Ohio River southeast of Cincinnati, eventually congealing into a line and threatening parts of southern Ohio and northeast Kentucky. Hail and wind damage reports came mainly from south of the river in Kentucky.

The final event was yet another strong line of storms across the Cincinnati metro area. These storms developed in Illinois during the afternoon, racing quickly across Indiana and into the tri-state region after 5:30 PM. Widespread wind damage was reported with this line of storms, along with one tornado in Dearborn County, Indiana. A few discrete storms developed along the Ohio River further east, and displayed signs of organization and rotation. One storm produced a tornado in Pendleton County, Kentucky.

Throughout the string of events, the repeated heavy rainfall led to widespread flash flooding across the region. Many roads and bridges were flooded, with some reportedly washed away entirely. A few resident evacuations were carried out in communities near Oxford and Eaton in Ohio.

In all, 22 tornado warnings, 40 severe thunderstorm warnings, and 22 flash flood warnings were issued. Five tornadoes were confirmed; all rated EF0 on the Enhanced Fujita scale, with wind speeds of 65 to 85 miles per hour.

Radar Improvements Come to the NWS in Wilmington

Dan Hawblitzel

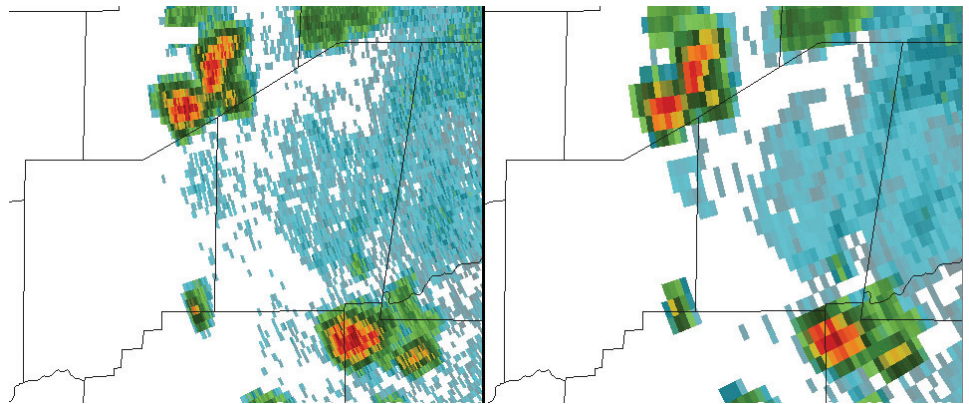
Meteorologists at the NWS in Wilmington received two significant enhancements to radar data in June 2008. The first improvement was an upgrade to the Wilmington radar to super-resolution data. This change does not affect the radar itself, but is a change in the way data is processed by computers on the ground. By changing the algorithms used to decode radar data, we are now able to view reflectivity data with an azimuthal resolution of 0.5° instead of 1° (meaning twice as many “spokes” of data extending outward from the radar with half the width), and range resolution improved from 1 km to 0.25 km (meaning 4 times as much data along a single spoke). As a result of this improved resolution, radar data appears much more detailed, especially at further distances from the radar. This change gives NWS meteorologists a better look at small-scale storm features like hook echoes and rotation. While a few websites might display the new detailed radar data, most locations online, including the NWS web pages, will still display the old resolution.

The second improvement was the introduction of Terminal Doppler Weather Radar (TDWR) data to the NWS.

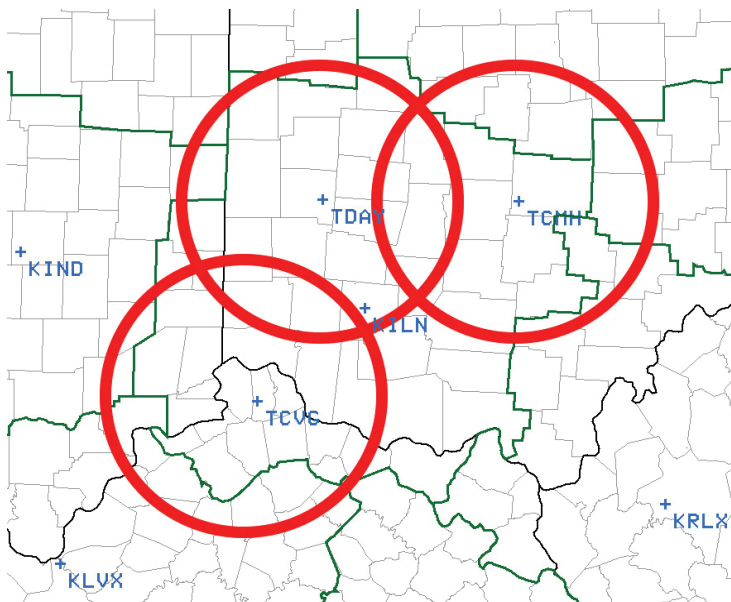
These radars have been in place for many years near major airports to detect wind shear and microbursts, and to enhance the safety of air travel. Now, NWS meteorologists have access to this data as well. While their primary purpose is to serve aviation, they also provide valuable data to NWS forecasters. Meteorologists at the NWS in Wilmington have access to three TDWRs: Dayton, Columbus and Cincinnati.

Access to these radars improves our view of precipitation across much of our warning area, especially areas such as west central Ohio, central Ohio and southeast Indiana/northern Kentucky, which are much closer to a TDWR than they are to the radar out of Wilmington. TDWRs allow for more data near the ground and at a higher resolution across these areas compared to the radar out of Wilmington. The NWS in Wilmington receives more TDWR coverage than almost any other NWS office.

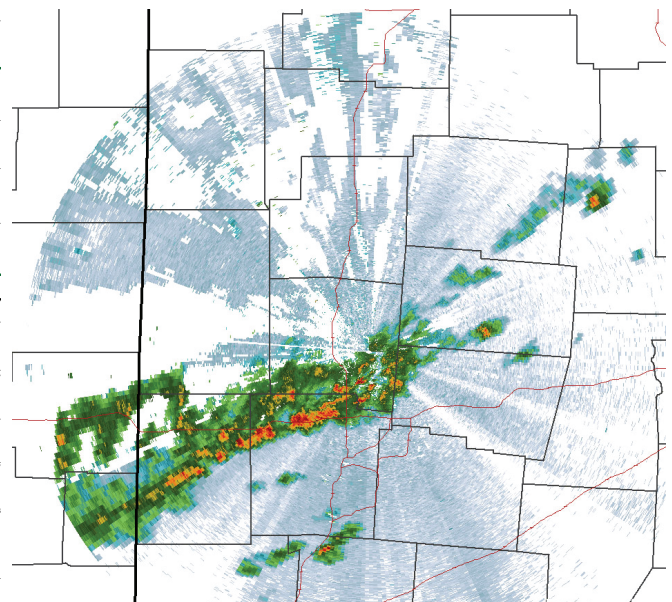
These radar upgrades have brought improved warning and forecast services to our customers, especially to those who live far away from the radar in Wilmington. These upgrades are part of an ever-ongoing effort by the NWS to serve and protect its customers with the latest and most advanced technology.



A comparison of super-resolution radar data (left) and the old radar resolution (right) of storms over southeast Indiana. Image courtesy NOAA.



Locations of the Cincinnati, Dayton and Columbus TDWRs and their areas of coverage. Image courtesy NOAA.



An example of TDWR data out of Dayton. Image courtesy NOAA.

Entry-Level Employment with the National Weather Service

Charlie Woodrum

Have you ever considered pursuing a career as a meteorologist with the National Weather Service? Many weather enthusiasts, scientists, and geographers do so every year. As a recently hired employee for the NWS, I have discovered what it takes to be hired, and what it is like working as a full-time meteorologist.

First of all, in order to be eligible for a job with the NWS, you must have completed at least a bachelor's degree in Atmospheric Sciences or Meteorology. The undergraduate programs across the country are challenging, requiring at least four semesters of calculus and two semesters of physics at most universities. After completion of these courses, the real fun begins, with synoptic, dynamic, and physical meteorology courses. On the surface, it may appear that these courses just involve observing, forecasting, and disseminating weather information to the public. However, calculus and physics are integral parts of these classes. If you really want to be a meteorologist, the skills that are required go far beyond forecasting.

After completion of a degree, the most challenging part ahead is applying for entry-level meteorology positions. These spots often are the most competitive in the Weather Service, because they require no previous full-time experience with the NWS and are open to anyone with a bachelor's degree or greater. Most candidates would make great forecasters for the NWS. However, there are so many applicants that previous experience is very beneficial. This experience can be gained through the student volunteer and student trainee (SCEP) programs. Involvement at an office can go a long way in embarking on a career as a meteorologist.

An entry-level employee for the National Weather Service is called a Meteorologist Intern. They may launch weather balloons twice a day, monitor hydro-meteorological concerns, contribute to disseminating severe weather information, and quality control products which are sent out across the internet and the NOAA Weather Radio. All of these duties ultimately contribute to training to become a forecaster. As a forecaster, meteorologists have the ability to issue all public and aviation forecasts, along with non-routine products associated with hazardous weather.

Those who work for the National Weather Service are a part of the National Oceanic and Atmospheric Administration (NOAA). NOAA is an agency under the Department of Commerce. To search for and apply for meteorologist jobs, visit <http://www.USAJOBS.gov>.

The Great Wind Storm of 2008

(continued from page 1)

which usually only last a matter of minutes.

While the winds caused damage across the entire forecast area, the heaviest damage occurred roughly through a corridor extending along and just north of the Ohio River through Indiana and Kentucky, and along and just north of the I-71 corridor in Ohio, encompassing the three metropolitan areas of Cincinnati, Columbus and Dayton. Damage to trees and structures across this corridor was widespread, and there were numerous injuries. Damage on either side of this corridor was less severe, but still significant. Numerous roads and highways were blocked or closed due to debris and fallen power lines. Crop damage is also said to be particularly bad, with damage to corn and soybean fields resulting in complete losses in some locations, and promising to make for a difficult harvest in others. Total restoration of commercial electricity took up to a week or greater in some locations. Six fatalities occurred within the NWS ILN's area of responsibility, with three occurring across the Cincinnati area, one east of Columbus in Fairfield County, and two in southeast Indiana.



A large tree smashes a car in Columbus, Ohio, just north of the Ohio State University. Photo courtesy of James Delewese.

This will go down in the books as a historic windstorm for the region. The rare combination of events, which included a remnant tropical system and a strong frontal boundary, contributed to producing a once in a lifetime windstorm for the region.

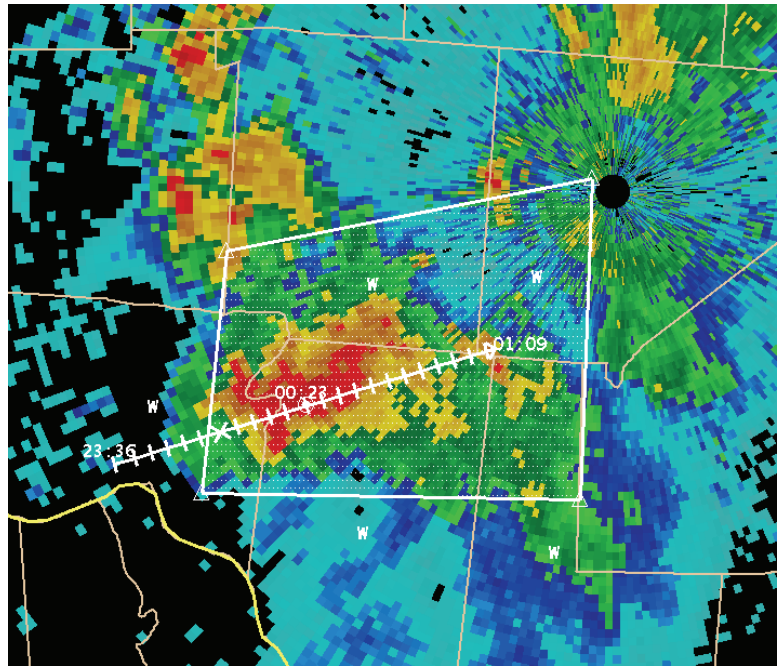
How the NWS Issues a Warning

Andy Hatzos

For those affected by a severe storm, issuance of a warning means a time for immediate action. For a National Weather Service meteorologist, issuing a severe weather warning is as easy as a few clicks of the mouse. Thanks to software known as WarnGen, warnings for severe thunderstorms, tornadoes, and flash floods can be created and disseminated in around 60 seconds.

A warning decision meteorologist will spend most of his or her time looking at radar imagery, analyzing radar patterns in terms of both precipitation intensity (reflectivity) and motion (Doppler radial velocity). When a decision is made that a warning is needed, the meteorologist will load the WarnGen software, which plots itself directly on top of the desired radar imagery.

From here, a forecaster must first define the location of the thunderstorm. This can be done using either a single point or a line segment. By looping the radar imagery back in time, a storm motion can also be plotted. The storm's location and motion are used to generate a track forecast. This forms the basis for the first-guess of the warning threat area, or the warning "polygon."



A warning polygon (white) is drawn around the track of tornadic thunderstorm in southwest Ohio. Image courtesy NOAA.

In October of 2007, the National Weather Service began issuing "storm-based warnings" nationwide, using irregular polygons to denote the area of highest severe threat. This replaced the county-based warning system used for many years prior to that. The first-guess polygon generated from the storm track can be adjusted in size and shape to cover the area the meteorologist deems most threatened by the storm.

At this point, the meteorologist will be able to select the type and duration of the desired warning. A number of pre-programmed text statements will also be available for selection by the meteorologist, highlighting specific threats or call-to-action statements. Information can also be added to provide a description of the warning's basis – such as a threat indicated by radar, or a spotter report. At this point, the simple click of a button will generate the entire body of the warning text – based on

the polygon drawn by the meteorologist, and the options selected thereafter. After one last quality-control check of the product, another button click will send it out for dissemination – to the media, NOAA Weather Radio, the internet, news wire services, and the entire world.

Time range

Duration: 45 min

00:24 Wed 12-Jul to 01:09 Wed 12-Jul [Change...](#)

Optional bullets:

***** BASIS FOR TORNADO WARNING (CHOOSE 1) *****

Meso with Tornadoic Potential - No tornado reported

Strong Meso/TVS - No tornado reported, but likely to occur

Strong Meso/TVS - Tornado previously reported

Spotters reported a tornado

Public reported a tornado

Local law enforcement reported a tornado

Emergency management officials reported a tornado

Large tornado on the ground!

No radar detection - Tornado reported

A menu provides the forecaster options for the warning statement. Image courtesy NOAA.

BULLETIN - EAS ACTIVATION REQUESTED
TORNADO WARNING
NATIONAL WEATHER SERVICE WILMINGTON OH
830 PM EDT TUE JUL 11 2006

THE NATIONAL WEATHER SERVICE IN WILMINGTON HAS ISSUED A

* TORNADO WARNING FOR...
NORTHWESTERN BROWN COUNTY IN SOUTHWEST OHIO...
NORTHERN CLERMONT COUNTY IN SOUTHWEST OHIO...
WESTERN CLINTON COUNTY IN SOUTHWEST OHIO...
NORTHEASTERN HAMILTON COUNTY IN SOUTHWEST OHIO...
SOUTHERN WARREN COUNTY IN SOUTHWEST OHIO...

* UNTIL 915 PM EDT.

The final warning text is generated. Image courtesy NOAA.

The Snowstorm of March 7-8, 2008

John Franks

Friday, March 7, 2008 saw the beginning of a record snowfall for the Ohio Valley. In the early morning hours, a cold front sagged southeast of the Ohio River and was a focus for precipitation development over the region that day. Surface low pressure in the lower Mississippi Valley tracked north and northeast into the Ohio Valley. This low received extra support by a strong long-wave trough of low pressure in the upper atmosphere that extended into the southern plains and moved east.

By noon, snow in portions of Kentucky and southeast Indiana had accumulated over an inch, and snowfall was expected to quickly overspread the remainder of the region. This first round of snowfall was in response to an upper level shortwave that moved northeast through the day. A lull in the snowfall occurred in its wake Friday evening, but was short-lived.

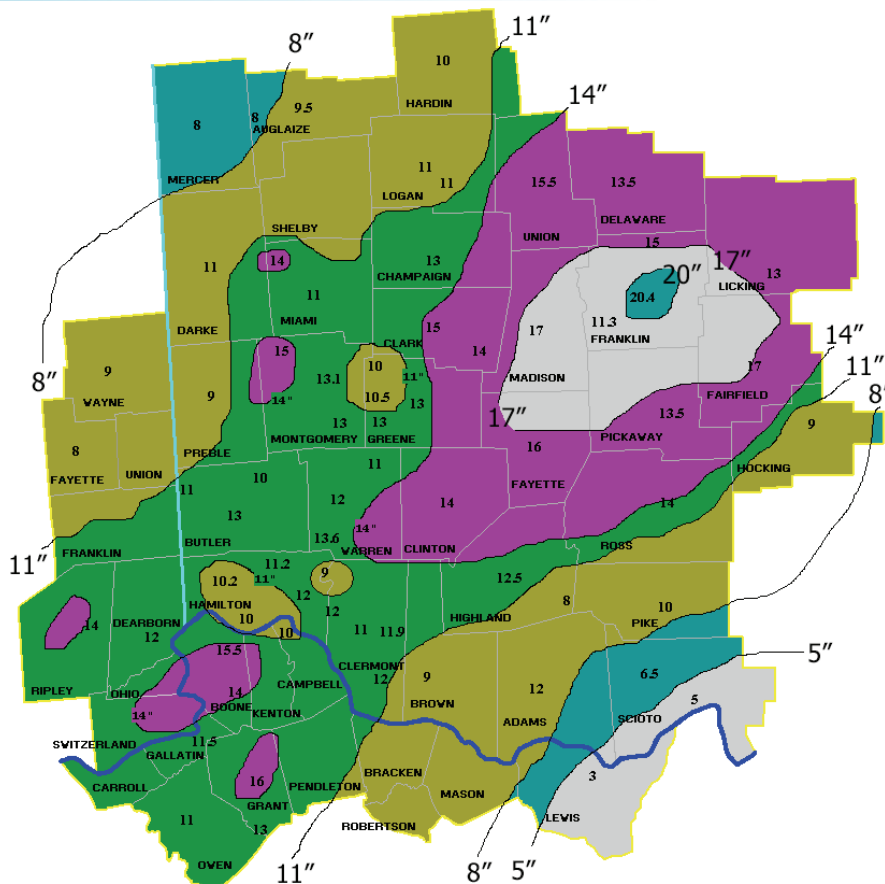
On Friday afternoon, our forecasters saw that the upper level low and another surface low along the southern Appalachians were going to meet in the region. The strengthening low pressure and favorable positioning of the upper low indicated that winds over much of the region were going to gust to 30 and 40 mph, so a blizzard warning was issued. The snow that had already fallen was generally 1 to 4 inches across the region.

By daybreak Saturday, March 8, snowfall measurements along the Interstate 71 corridor were 6 to 10 inches, with lesser amounts tapering to the northwest and southeast. Radar returns to Wilmington's southeast (in northeast Kentucky and the southern Scioto valley) were showing that sleet had mixed in with the snow, reducing the total depth of the snow in this area.

The winds and extremely heavy snowfall continued into the day Saturday with much of the region seeing a foot of snow with drifts of up to four feet. The Columbus area received the most snow ever recorded from a storm – 20.4 inches measured at the Port Columbus International Airport.

By Saturday evening, snow ended from west to east, while winds let up and visibilities increased, allowing clean up efforts to begin. Over a foot of snow fell along the Interstate 71 corridor, from Louisville through Cincinnati, and Columbus to Cleveland.

One question that crops up from this event is that a number of observations around the airport in Columbus came in with lower snowfall totals of 18 inches or so. The observers at the airport clear snow off of a "snow board" every six hours and tally up these observations for the running total. If this snow was not cleared off, it would have likely compacted down to the 18 inches that most of Columbus saw when it was all said and done.



An analysis of snowfall over the Wilmington NWS area. Image courtesy NOAA.



An 18-inch snow drift is measured in Beavercreek. Image courtesy Ken LeBlanc.

Flooding and Drought in the Ohio Valley

Julie Dian-Reed

Following extended dryness and heat during the summer of 2007, the overall precipitation pattern slowly changed over the middle Ohio Valley, bringing rainfall to more 'normal' levels. Precipitation recovery began over much of the area in mid October 2007, with a monthly total of 7.07" recorded at Cincinnati, most of which fell in just 6 days of the month. This monthly total was more than the June-September 2007 total combined, with just 6.68" falling in that 4 month period.

The winter/spring flood season began with minor flooding that occurred in January and February 2008, which was relatively minor with one exception. The far northwest counties within the NWS Wilmington area are Mercer and Auglaize counties of Ohio. This area normally receives 2 to 3" of rain in February, but February 2008 brought from 4 to nearly 7" for the month. The observing station in Celina reported 6.78" for February, with radar estimating between 7 and 8" over portions of central Auglaize County. The result was major flooding along portions of the Auglaize River, where evacuations of dozens of homes occurred during February 5 and 6. This flooding was result of heavy rain on top of melting snow. The St. Mary's river in Auglaize and Mercer County also flooded, with the gage at Rockford (installed in 2005) reaching it's highest crest to date, at 14.5'.

March 2008 brought more widespread flooding, with evacuations and flooding of homes/businesses occurring along the Little Miami River in Warren County. While the vast majority of the area received double the normal March rainfall (typically ranging from close to 2" in the north to near 4" in the far south), southwest Ohio, southeast Indiana and far northern Kentucky received nearly triple the March precipitation – with several observing stations reporting from 10 to 12" for the month. In the Scioto basin, the forecast points at Circleville and Piketon remained above flood stage for the vast majority of the month of March. March 2008 saw the most widespread flooding since January 2005. While the flooding of March 2008 certainly resulted in many evacuations and some areas where homes/businesses were inundated, it was not nearly to the scale of the January 2005 flood in Ohio, or the record March 1997 flood in Northern Kentucky and southern Ohio. Despite this, three people still tragically lost their lives due to river flooding or flash flooding during the month. Some areas of the Great and Little Miami basins recorded crest levels among the top 10 highest in gage history, including the Great Miami at Miamitown and the Little Miami at Milford.

A very wet June resulted in flooding along 6 forecast points, a result of rainfall from 6 to 9" or more across an area from the Whitewater basin of Indiana to the Licking basin of Ohio. The Port Columbus Airport reported their wettest June on record and the 5th wettest overall month on record, with 10.39" for the month (6.31" above normal). On June 26th, flash flooding over Fairfield and Licking counties resulted in several homes being flooded, as well as the closure of I-70 in Licking county for the second time in 2008.

It seems we've come full circle from this time last year, as the months of July-September have yielded overall drier than normal conditions through the area. With the tri-state area being dry since the beginning of July, this rainfall deficit is not nearly as long lived as that of 2007, nor was it combined with record-setting heat. The June-September rainfall deficit for Cincinnati in 2007 was 8.1" below normal, while in 2008 the deficit was 2.92". There are some places in which the 90 day rainfall is close to 6" below normal, based on radar estimates combined with climatological data. For more information on rainfall in the Ohio valley and nationwide, check out the National Precipitation Analysis Page at <http://www.water.weather.gov>.



The National Weather Service WSR-88D Radar in Wilmington, Ohio -- by day and by night.

New Damage Photographs from the 1974 Xenia Tornado

The NWS Wilmington Ohio recently acquired 42 pictures of damage from the Xenia F5 tornado, which occurred on April 3, 1976. The tornado killed over 30 people, and injured over a thousand.

These photographs originated from the Public Safety Communication Center of Berrien County, Michigan. They were taken by a former Berrien County Emergency Management Coordinator who likely aided in recovery efforts. It is believed that these photographs have never before been published. The NWS Wilmington would like to extend our appreciation to the PSCC of Berrien County, Michigan, for sending us these photographs.

The full set of photographs has been posted to our web site. You can visit it by using the following address

<http://www.weather.gov/iln/Xenia1974/>





National Weather Service
1901 S. State Route 134
Wilmington, OH 45177

www.weather.gov/iln/